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22850	7590	05/24/2007	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			MCNELIS, KATHLEEN A	
ART UNIT		PAPER NUMBER		
		1742		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)
	10/537,861	ITO ET AL.
	Examiner Kathleen A. McNelis	Art Unit 1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 19 March 2007.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-6 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-6 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3) Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claims Status

Claims 1-6 remain for examination wherein claim 1 is amended.

Acknowledgement of RCE

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CRF 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/19/2007 has been entered.

Status of Previous Rejections

The following rejections are withdrawn in view of amendments to the claims:

- Claims 1-6 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement,
- Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention,
- Claims 1 and 2 under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (U.S. P.G. Pub. 2001/0027701), and
- Claims 1 and 2 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 7 of U.S. Patent No. 6,630,010 (Ito et al. '010).

The following rejections are maintained:

- Claims 1 and 6 under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. Pat. No. 6,251,156),
- Claims 1 and 6 under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. PG. Pub. 2001/0054329), and

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- Claims 2-5 under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. Pat. No. 6,251,156) as applied to claim 1 and further in view of Hoffman et al. (U.S. Pat. No. 6,648,942).

DETAILED ACTION

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1 and 2 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 7 of U.S. Patent No. 6,630,010 (Ito et al. ‘010) in view of Hoffman et al. (U.S. Pat. No. 6,251,156) or Hoffman et al. (U.S. PG. Pub. 2001/0054329).

With respect to instant claim 1:

- Ito et al. ‘010 claim 1 discloses a method of heating a formed raw material in a reducing melting furnace wherein the raw material contains iron oxide, carburizing reducing agent and calcium oxide. The calcium oxide present in sufficient quantity to form a slag within a basicity value of between 0.6 and 1.8. The range of between 0.6 and 1.8 overlaps the claimed range of 1.1 or more. It would have been obvious to one of ordinary skill in the

art at the time the invention was made to adjust slag basicity to the range of between 1.1 and 1.8 since Ito et al. '010 teaches that any value between 0.6 and 1.8 has equal utility. While Ito et al. '010 does not disclose that calcium oxide is fed in an amount of 40 kg or less per ton of molten iron, Ito et al. '010 expresses the basicity as a ratio of CaO to SiO₂, and teaches that CaO is added to achieve a basicity value in the range of between 0.6 and 1.8. The quantity of CaO added is therefore a result effective variable which affects the basicity of the slag. It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the quantity of calcium oxide added as result-effective variables to affect the slag basicity (see M.P.E.P 2144.05, II, B);

- In claim 7, Ito et al. '010 discloses that the iron is metallized to not less than 80% and the carbon content is not less than 3.5%. The range of not less than 3.5% is within the claimed range of 3.0% or more. The range of not less than 80% reduction is the same as the claimed range of a metallization ratio of 80% or more.

Ito et al. '010 does not disclose that another amount of CaO containing material is fed into the melting furnace.

Hoffman et al. '156 (Col. 4 lines 32-60) or Hoffman et al. '329 (paragraph 0024) discloses adding two portions of CaO. The first portion is mixed with the feed to the reducing furnace as slag formers (16). Hoffman et al. '156 (col. 5 lines 37-47) or Hoffman et al. '329 (paragraph 0030) further discloses that additional iron oxide, carbon compounds and slag modifiers including lime (i.e. CaO) may be added to the electric arc melter as necessary to augment the composition of the hot DRI discharged from the rotary hearth furnace.

Hoffman et al. '156 (col. 4 lines 32-60) or Hoffman et al. '329 (paragraph 0024) teaches that calcium and magnesium oxides are added in specific tailored compositions to influence the desulfurization of the bath, and provides ranges for acceptable C/S and V ratios of between 0.5 and 2.2 and between 0.4 and 1.4 respectively (col. 4 lines 32-60). Both C/S and V are measures of

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slag basicity. The ranges of between 0.5 and 2.2 and 0.4 and 1.4 overlap the claimed range of 1.1 or more.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional CaO as a second portion to the electric melter as taught by Hoffman et al. '156 or Hoffman et al. '329 to augment the composition of the hot DRI discharged from the rotary hearth furnace in order to maintain a slag basicity within the ranges desired in Ito et al. '701.

While Hoffman et al. '156 (col. 4 lines 32-60) or Hoffman et al. '329 (paragraph 0024) do not recite that the amount of CaO containing material added to the melting furnace is not more than 40 kg/ton of molten iron, Hoffman et al. '156 (col. 6 line 57 – col. 7 line 11) or Hoffman et al. '329 (paragraph 0035) teaches that the CaO and MgO additives are tailored to a specific composition based on the sulfur content of the bath. The CaO and MgO concentrations are therefore recognized as result-effective variables in the art, which are varied to affect the desulphurization of the melt. It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the CaO and MgO as result-effective variables to affect the desulfurization of the melt (see M.P.E.P 2144.05, II, B).

With respect to instant claim 2, Ito et al. '010 discloses in claim 2 that a carbonaceous material is charged onto the hearth before the formed raw material (discussed above regarding instant claim 1) and in claim 3 that the particle size is 3 mm or less. Particles having a diameter of 3 mm or less are “powdery” as in instant claim 2.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. Pat. No. 6,251,156).

Hoffman et al. '156 is applied to claims 1 and 6 as set forth in the 03/06/2006 and 11/17/2006 Office actions.

With respect to the amended limitations to claim 1, Hoffman et al. '156 discloses adding two portions of CaO. The first portion is mixed with the feed to the reducing furnace as slag formers (16) (Col. 4 lines 32-60). Hoffman et al. '156 further discloses that additional iron oxide, carbon compounds and slag modifiers including lime (i.e. CaO) may be added to the electric arc melter as necessary to augment the composition of the hot DRI discharged from the rotary hearth furnace (col. 5 lines 37-47).

Hoffman et al. '156 teaches that calcium and magnesium oxides are added in specific tailored compositions to influence the desulfurization of the bath, and provide ranges for acceptable C/S and V ratios of between 0.5 and 2.2 and between 0.4 and 1.4 respectively (col. 4 lines 32-60). Both C/S and V are measures of slag basicity. The ranges of between 0.5 and 2.2 and 0.4 and 1.4 overlap the claimed range of 1.1 or more.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional CaO as a second portion to the electric melter as taught by Hoffman et al. '156 to augment the composition of the hot DRI discharged from the rotary hearth furnace in order to maintain a slag basicity within the ranges desired in Hoffman et al. '156.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. PG. Pub. 2001/0054329).

Hoffman et al. '329 is applied to claims 1 and 6 as set forth in the 03/06/2006 and 11/17/2006 Office actions.

With respect to the amended limitations to claim 1, Hoffman et al. '329 discloses adding two portions of CaO. The first portion is mixed with the feed to the reducing furnace as slag formers (16) (paragraph 0024). Hoffman et al. '156 further discloses that additional iron oxide, carbon compounds and slag modifiers including lime (i.e. CaO) may be added to the electric arc melter as necessary to augment the composition of the hot DRI discharged from the rotary hearth furnace (paragraph 0030).

Hoffman et al. '329 teaches that calcium and magnesium oxides are added in specific tailored compositions to influence the desulfurization of the bath, and provide ranges for acceptable C/S and V ratios of between 0.5 and 2.2 and between 0.4 and 1.4 respectively (paragraph 0024). Both C/S and V are measures of slag basicity. The ranges of between 0.5 and 2.2 and 0.4 and 1.4 overlap the claimed range of 1.1 or more.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional CaO as a second portion to the electric melter as taught by Hoffman et al. '329 to augment the composition of the hot DRI discharged from the rotary hearth furnace in order to maintain a slag basicity within the ranges desired in Hoffman et al. '329.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (U.S. P.G. Pub. 2001/0027701) in view of Hoffman et al. (U.S. Pat. No. 6,251,156) or Hoffman et al. (U.S. PG. Pub. 2001/0054329).

Ito et al. ('701) discloses a method for producing granular metallic iron by heating iron oxide and carbonaceous reductant in an reduction melting furnace, thereby reducing iron to not less than 80% reduction with a residual carbon content of not less than 3.5% and charging this iron into a steelmaking furnace wherein molten steel is produced. Calcium oxide is blended with the iron ore and carbonaceous reducing agent to the hearth of a moving hearth type reduction-melting

furnace in a quantity to adjust the slag basicity in the range of between 0.6 and 1.8 (p. 19 claims 1, 4, 5, 7 and 8). The range of not less than 3.5% is within the claimed range of 3.0% or more. The range of not less than 80% reduction is the same as the claimed range of a metallization ratio of 80% or more. The range of 0.6 to 1.8 overlaps the claimed range of 1.1 or more. It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the slag basicity to between 1.1 and 1.8, since Ito et al. '701 teaches that any value between 0.6 and 1.8 has equal utility for lowering the sulfur content (claim 4). Ito et al. ('701) teaches that the quantity of calcium oxide added is determined based on achieving a slag basicity of between 0.6 and 1.8, and is preferably within the range of between 3.0 and 5.0% based on the total amount of formed raw material (paragraph 0118). The range of between 3.0 and 5.0 % overlaps with the claimed range of 40 kg or less per ton (i.e. less than or equal to 4 wt %). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add between 3.0 and 4.0 wt % calcium oxide, since Ito et al. ('701) discloses that the entire range between 3.0 and 5.0 is preferred for maintaining a slag basicity within the desired range. Ito et al. '701 discloses blending with the raw material between 2.0 and 7.0% CaO (¶ 0118), which overlaps the claimed range of not more than 40kg/ton of molten iron (i.e. about 4.4%), therefore a prima facie case of obviousness exists. The ranges of slag basicity disclosed in Ito et al. '701 overlaps the instant claimed range of 1.1 or more as set forth in the 3/6/2006 office action.

Ito et al. does not disclose that another amount of CaO containing material is fed into the melting furnace.

Hoffman et al. '156 (Col. 4 lines 32-60) or Hoffman et al. '329 (paragraph 0024) discloses adding two portions of CaO. The first portion is mixed with the feed to the reducing furnace as slag formers (16). Hoffman et al. '156 (col. 5 lines 37-47) or Hoffman et al. '329 (paragraph 0030)

further discloses that additional iron oxide, carbon compounds and slag modifiers including lime (i.e. CaO) may be added to the electric arc melter as necessary to augment the composition of the hot DRI discharged from the rotary hearth furnace.

Hoffman et al. '156 (col. 4 lines 32-60) or Hoffman et al. '329 (paragraph 0024) teaches that calcium and magnesium oxides are added in specific tailored compositions to influence the desulfurization of the bath, and provides ranges for acceptable C/S and V ratios of between 0.5 and 2.2 and between 0.4 and 1.4 respectively (col. 4 lines 32-60). Both C/S and V are measures of slag basicity. The ranges of between 0.5 and 2.2 and 0.4 and 1.4 overlap the claimed range of 1.1 or more.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add additional CaO as a second portion to the electric melter as taught by Hoffman et al. '156 or Hoffman et al. '329 to augment the composition of the hot DRI discharged from the rotary hearth furnace in order to maintain a slag basicity within the ranges desired in Ito et al. '010.

While Hoffman et al. '156 (col. 4 lines 32-60) or Hoffman et al. '329 (paragraph 0024) do not recite that the amount of CaO containing material added to the melting furnace is not more than 40 kg/ton of molten iron, Hoffman et al. '156 (col. 6 line 57 – col. 7 line 11) or Hoffman et al. '329 (paragraph 0035) teaches that the CaO and MgO additives are tailored to a specific composition based on the sulfur content of the bath. The CaO and MgO concentrations are therefore recognized as result-effective variables in the art, which are varied to affect the desulphurization of the melt. It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the CaO and MgO as result-effective variables to affect the desulfurization of the melt (see M.P.E.P 2144.05, II, B).

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With respect to claim 2, Ito et al. '701 discloses in claim 2 that a carbonaceous material is charged onto the hearth before the formed raw material (discussed above regarding instant claim 1). Ito et al. '701 discloses that first a powder of carbonaceous material is spread on the hearth, then pellets are charged (paragraphs 0201 and 0202).

Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. Pat. No. 6,251,156) as applied to claim 1 and further in view of Hoffman et al. (U.S. Pat. No. 6,648,942).

Hoffman et al. '156 in view of Hoffman et al. '942 is applied to claims 2-5 as set forth in the 3/6/2006 and 11/17/2006 Office action.

Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman et al. (U.S. Pat. No. 6,251,156) or Hoffman et al. (U.S. PG. Pub. 2001/0054329) as applied to claim 1 and further in view of WO 00/29628 (WO '628).

Hoffman et al. '156 or Hoffman et al. '329 is applied as discussed above regarding claim 1.

Hoffman et al. '156 or Hoffman et al. '329 does not disclose that carbon is fed onto the hearth (claim 2), or that the amount is 30 kg carbon or more per ton of molten iron (claim 3).

With respect to claim 2, WO '628 discloses a method for direction reduction of iron oxides using a rotary hearth furnace where a carbon compound coating material is placed on the hearth prior to the iron oxides to prevent attack on the hearth (abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to spread a carbonaceous coating material as taught by WO '628 on the hearth of Hoffman et al. '156 or Hoffman et al. '329 to protect the hearth as taught by WO '628.

With respect to claim 3, while Hoffman et al. '156 or Hoffman et al. '329 in view of WO '628 does not specifically teach adding at least 30 kg or more of carbonaceous material per ton of

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molten iron, WO '628 teaches that the carbon provides protection of the hearth, therefore the quantity of carbon added is a result effective variable depending at least upon the size of the hearth and the relative proportional amount of carbon protective layer to iron (i.e. Kg carbon/ton of iron) would depend at least upon the thickness of iron spread upon the hearth. The thickness of materials is a variable addressed by Hoffman et al. '156 (col. 4 line 61 – col. 5 line 2) or Hoffman et al. '329 (paragraph 0025) as regards to uniform heating and would have been optimized by one of ordinary skill in the art at the time the invention was made (see M.P.E.P. 2144.05, II, B).

With respect to claims 4 and 5, the quantity of CaO added is addressed above regarding claims 1 and 6 as rejected under Hoffman et al. '156 or Hoffman et al. '329 and the quantity of carbon is addressed above regarding claim 3 as rejected under Hoffman et al. '156 or Hoffman et al. '329 in view of WO '628.

Response to Arguments

Applicant's arguments filed 02/20/2007 with respect to maintained rejections have been fully considered but they are not persuasive.

Arguments are summarized as follows:

1. The cited prior art does not disclose adding CaO in two portions.
2. The instant claims require limiting the second amount to 40 kg/ton of molten iron.
3. Applicant has found significant adverse affects when the amount of a slag-conditioning agent added together with the solid reduced iron exceeds 40 kg/ton of molten iron.

Examiner's responses are as follows:

1. Hoffman et al. '156 (Col. 4 lines 32-60) or Hoffman et al. '329 (paragraph 0024) discloses adding two portions of CaO. The first portion is mixed with the feed to the reducing furnace as slag formers (16). Hoffman et al. '156 (col. 5 lines 37-47) or Hoffman et al. '329 (paragraph 0030) further discloses that additional iron oxide,

carbon compounds and slag modifiers including lime (i.e. CaO) may be added to the electric arc melter as necessary to augment the composition of the hot DRI discharged from the rotary hearth furnace.

2. The claim limits the amount of CaO material fed into the melting furnace to 40 Kg/ton of molten iron. There is no limitation in the claims that prevents the addition of the CaO remaining from the reduction furnace with the reduced iron as an additive to the melting furnace, even though this portion has previously been added to the reduction furnace. There is no limitation preventing the addition of an additional portion (e.g. a third portion) of CaO. Therefore based on the present wording of claim 1, examiner does not agree that the limitation of 40 kg/ton applies only to the second portion, but rather that it limits the total amount of CaO-containing material added to the melting furnace from any source to 40 kg/ton. This limitation was addressed on p. 4 of the 11/17/2006 Office action regarding Hoffman et al. '156 and pp. 4-5 of the 11/17/2006 Office action regarding Hoffman et al. '329.
3. It is unclear which portion of the CaO this argument refers to. However, as stated above regarding argument 2, examiner's position is that the way the claim is presently worded the limitation of 40 kg/ton applies to the total amount of CaO-containing material added to the melting furnace from any source.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAM

05/15/2007 *Kam*

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